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Enclosed is additional material we have shared with the Commission.

Please feel free to contact either of us should you have any questions on this material.

Sincerely,


Betsy J. Brady
457-3824


Bruce Cox
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APPENDIX E

Technical references for Signaling Network Elements Interfaces

Bellcore Documents

SR-NWT-001944

Common Channel Signaling Interoperability Analysis Program

TR-NWT-000246

Bell Communications Research Specification of Signaling System Number 7

TA-STIS-000298

STP/SEAS and SCP/SMS Data Communication Interface Protocol Specification

TS-TSV-000905

Common Channel Signaling (CCS) Network Interface Specification

TR-NWT-000954

Common Channel Signaling (CCS) Network Interface Specification Supporting Alternate Billing Services (ABS)

TR-NWT 000082

Signaling Transfer Point (STP) Generic Requirements, Issue 5 (Bellcore, December 1993)

TR-NWT-000533

Service Switching Points, FSD 31-01-0000, Issue 3 (Bellcore, January 1994). (A module of LSSGR, FR-NWT-000064.)

Ameritech Document

AM TR-OAT-000069

Common Channel Signaling Network Interface Specification

Pacific Telesis Document

PUB L-780023-PB/NB

Pacific Bell / Nevada Bell Common Channel Signaling Network Interface Specification

Southwestern Bell Document

TP 76638

Common Channel Signaling Network Interface Specification

U.S. West Document

77342

U.S. West Common Channel Signaling Network Interface Specification

APPENDIX F

Operations Support Systems examples of Systems and Technical Standards for Interfaces

Local Loop

Loop Management Operations System (LMOS) -- LMOS and associated systems are used to access, test and manage the repair of troubled loops.

Switching

Remote Memory Administration System (RMAS) -- Provisioning of local switch office parameters, e.g. provisioning of AIN switch triggers if the SSP is unbundled.

Signaling

Network Traffic Management Operations System (NTMOS) -- Management of local circuit and packet switched (SS7) network, e.g. management of AIN SSP to SCN/SCP signaling network.

Transport

Mechanized Loop Testing (MLT) -- performs fault sectionalization in the distribution plant for both metallic and fiber transport.

Information Systems - Synchronous Optical Network (SONET) - Operations, Administration, Maintenance, and Provisioning (OAM&P) - Communications (ANSI T1.119-1994)(P)

Operation, Administration, Maintenance and Provisioning - Human-Machine Language (ANSI T1.203-1988)(P)

OAM&P - Upper Layer Protocols for TMN Interfaces Between Operations Systems and Network Elements (ANSI T1.208-1993)(P)

OAM&P - A Generic Network Model for Interfaces Between Operations Systems and Network Elements (ANSI T1.214-1990)(P)

Interconnection, Unbundling and Total Service Resale

Section 251 of the Communications Act gives the Commission the broad authority and the legal responsibility to adopt whatever regulations are required to permit the competitive provision and competitive pricing of exchange and exchange access services in accord with the requirements of that section. This memorandum sets forth AT&T's position on the specific regulations that the Commission should adopt to implement Sections 251(c)(2), (c)(3), and (c)(4) of the Act.¹

These provisions of the Act impose duties on incumbent local exchange carriers (sometimes referred to as "ILECs") to allow competitive carrier both (1) to obtain access to the ILECs' network elements on an unbundled basis at any technically feasible point and at reasonable rates that represent the actual economic cost of the elements (§§ 251(c)(2)&(3) & 252(d)(1)) and (2) to obtain (subject to certain limited restrictions) the ILEC's existing services at wholesale rates that are based on the ILEC's actual retail rates, less the billing, marketing, and other costs that the ILEC avoids by providing the existing services at wholesale (§ 251(c)(4)). Section 251(d) directs the Commission to "establish regulations to implements the

¹ Under Section 251(d), the Commission is also required to establish regulations implementing the provision of Section 251 dealing with pole attachments, collocation, number portability and dialing parity. Although not addressed in these Comments, AT&T believes that prompt and detailed implementing of these matters are indispensable to the development of local competition.

requirements" of Section 251 within six months of its February 8, 1996 effective date. The Commission thus has the responsibility to develop regulations that define the unbundled network elements, the technically feasible points at which interconnection must be permitted, the method by which cost-based prices are to be determined for unbundled elements, and the ILECs' duties to allow resale of their existing services.

The specific regulations that AT&T believes necessary and appropriate will be discussed in detail below. However, before considering the specific content of the rules that AT&T proposes, three general points should be made.

First, the Commission should, and we submit must, resist any suggestions that it defer to states either on the interpretation of Section 251 of the Act or on the establishment of the specific regulations or obligations that are required to implement it. Congress imposed the duty to develop implementing regulations on the Commission because uniform national regulations are an essential precondition to the achievement of the Act's objective of fostering competitive exchange services. In this regard, because the Act seeks to create competitive exchange services in each state in the country, a decision to defer to state commissions would prevent the achievement of the Act's purposes in any state which preferred monopoly to competition or which, for whatever reason, adopted regulations

that would have the purpose or effect of preventing the development of effective exchange competition. In this regard, the benefits that Congress sought to create consist not only of lower priced or higher quality exchange services, but also the increased investment and economic, social, and other benefits that it will foster. Congress insisted on national standards to assure that these benefits are created in each state and that the nation is not divided between "have" and "have not" states.

Further, a decision to defer to states would produce adverse consequences and interference with national policy that would not be limited to the particular states that had restrictive rules or policies. While exchange services is assuredly a local business, it is a local business which firms can and will enter in multiple states or nationally, and the costs of entry will be reduced -- and the effectiveness of new entrants will be increased -- if there is a uniform national set of rules governing the critical aspects of a new entrant's relationship with the incumbent LEC. Conversely, if the Commission permitted any individual state to enforce restrictive rules, that would impair competition outside that state's borders as well as within them.

In all these respects, the need for effective national regulations is heightened by the fact that the Act otherwise relies on negotiation with ILECs and conciliation by state

commissions to establish interconnection and unbundling arrangements. Because the ILECs have both powerful incentives to delay and frustrate effective exchange competition and immense advantages in bargaining power, the only way the state-supervised negotiations prescribed by Section 252 can achieve appropriate results is if the Commission makes it clear now that it will adopt binding federal regulations that will maximize competitive opportunities -- and then adopts such regulations within the statutory six month period. Indeed, it is only because the Commission has this authority that Congress could otherwise provide for negotiation and conciliation by state commissions.

Second, the Commission's authority is to adopt the specific regulations that are required to implement the Act by defining the incumbent LEC's duties to other carriers, not by taking over all state regulation of these matters by, for example, setting specific intrastate rates for the unbundled elements that incumbent LECs provide to other carriers. The Commission can and should discharge this responsibility by adopting regulations that prescribe the method of determining the applicable charges and that can be applied by carriers and, if necessary state commissions, to produce charges for unbundled elements and other services that represent their actual economic cost -- which is critical to the achievement of the Act's purposes. With effective national regulations, the details of

their application can be left to carriers and the state commissions with future intervention by the Commission limited to any circumstances in which national policy is not effectively implemented.

At the same time, interexchange carriers use unbundled elements of ILEC networks in the same way as do competitive LECs, and the Commission can and should here adopt and prescribe the same principles for the setting of both interstate and intrastate access charges. Section 251(c)(2) expressly applies to interconnection for the routing of exchange access as well as exchange services, and Section 251(c)(3) requires the unbundled provision of any network elements (including capabilities and functionalities of facilities as well as the physical facilities themselves) that are requested by any provider of telecommunications services, including interexchange carriers. The statute thus provides a clear basis and mandate for the long overdue reform of interstate access charges, particularly because this reform is a necessary precondition to the future authorizations of in-region interLATA services by BOCs that can be sought under Section 271 after, inter alia, Section 251 has been implemented.

Third, it is apparent from the face of Sections 251(c)(2), (c)(3), and (c)(4) that they are designed to allow firms to choose among a number of different means of entering

local exchange markets. Section 251(c)(4) allows a new firm to enter by obtaining for resale an incumbent LEC's existing services at prices that are derived from an ILEC's existing retail rates -- in which case the new entrant is constrained to offer the same communications capabilities as the ILEC and to compete solely on price, customer service, or other such factors.

Sections 251(c)(2)&(3) allow a firm to enter by obtaining some or all of an ILEC's network elements at their economic cost -- in which case the new entrant has the ability both to supply facilities or functionalities of its own to enhance the communications offering itself and to combine existing capabilities in new or different ways.

As the Act's terms establish, each of the possible forms of entry is important, and it likely is the case that there are areas of the country or segments of markets for which only one of these forms of entry is practicable. Accordingly, it is critically important that the Commission adopt rules that will permit each form of entry to occur in ways that will maximize consumer benefits in accord with the terms and purposes of the law. Conversely, those objects of the law would be defeated if any attempt were made to develop rules that would favor one form of entry over another.

Against this background, AT&T will describe the specific regulations that it believes the Commission should

propose and adopt to govern (1) the ILEC Section 251(c)(2)&(3) duties to provide interconnection and access to unbundled elements at every technically feasible point, (2) the ILEC duties under these section to establish charges for these unbundled elements and interconnections that reflect their actual economic cost (not the costs derived from rate or return regulation), and (3) the ILEC duty under Section 251(c)(4) to offer their existing services for resale.

I. UNBUNDLED ACCESS TO NETWORK ELEMENTS

Section 251(c)(3) of the Act requires incumbent local exchange carriers ("ILECs") to provide "to any requesting telecommunications carrier for the provision of a telecommunications service, nondiscriminatory access to network elements on an unbundled basis at any technically feasible point . . . in a manner that allows requesting carriers to combine such elements in order to provide such telecommunications service." As the Act thus recognizes, fundamental unbundling is essential to the development of local exchange competition. Facilities-based entry necessarily will proceed by steps, because it will be efficient for competitive local exchange carriers ("CLECs") to bypass some elements of the ILEC networks more quickly than others. Indeed, the Act contemplates that it may be inefficient for some competitors ever to duplicate all of the ILEC's network elements. By requiring the bundling of discrete network elements, therefore, ILECs could impose substantial burdens on new entrants by forcing them to purchase ILEC facilities that they do not need or that they could more efficiently provision or obtain from other sources, in order to obtain other ILEC facilities for which alternatives are currently unavailable or impractical. ILEC bundling would also foreclose emerging competition in the provision of local exchange network elements by alternative suppliers.

In adopting regulations to implement this section, the Commission should determine the minimum number of unbundled network elements that ILECs must initially make available to satisfy the requirements of Section 251(c)(3). In making this determination, the Commission should be guided by two principal considerations.²

First, the Act broadly defines the "network elements" that must be made available to competing carriers to include all facilities and equipment, and all "features, functions, and capabilities" provided through such facilities and equipment, that the ILEC uses to provide its own services.³ The Act expressly states that these are to include not only elements involved in the "transmission" and "routing" of the actual call, but associated signaling systems and databases (such as billing information) that are otherwise used by the ILEC in providing

² Such regulations should not be viewed as prescriptive of all network elements that may be subject to the unbundling requirement or all necessary points of interconnection. Rather, they should be viewed as minimum requirements of the statute that may be supplemented by future market or technical developments.

³ Section 3(45) of the Act defines the term network element to mean "a facility or equipment used in the provision of a telecommunications service. Such term also includes features, functions, and capabilities that are provided by means of such facility or equipment, including subscriber numbers, databases, signaling systems, and information sufficient for billing and collection or used in the transmission, routing, or other provision of a telecommunications service."

service. Therefore, ILECs are not merely required to make loops and switches available to new entrants, but the entirety of their network operations, including, for example, automated interfaces to operations systems that support all of the individual unbundled network elements. Any effort by an ILEC to limit the available offerings to only the most basic network functions would therefore be contrary to the Act.

Second, the Commission should order the unbundling of ILEC network elements to the maximum feasible extent, so as best to promote the statutory goal of fostering local exchange competition. If a network element can be discretely identified, if there is a reasonable prospect that either that element or an element "adjacent" to it in the communications path can be provided on a competitive basis (or self-provided by a competing carrier), and if unbundling that element is technically feasible, then that element should be made available on an unbundled basis.

In the first part of this section, we define the 11 separate network elements that we believe initially satisfy that standard. For each of the 11 elements, we describe the competitive rationale for requiring it to be offered on an unbundled basis, and explain why such a requirement would be technically feasible. In the second and third parts of this section, we address how the additional statutory requirements that interconnection must be made available "at any technically

feasible point" and that competing carriers be "allow[ed] . . . to combine such elements in order to provide . . . telecommunications services" should be effectuated.

A. The 11 Network Elements

The 11 network elements that should be provided on an unbundled basis consist of the following: three loop elements -- (1) loop distribution, (2) loop concentrator/multiplexer, and (3) loop feeder; (4) end office switching (including capabilities to assign Advanced Intelligent Network ("AIN") triggers); (5) operator systems; three transport elements -- (6) dedicated transport, (7) common transport, and (8) tandem switching; and three signaling elements -- (9) signaling link, (10) signal transfer point, and (11) service control point. Each of these unbundled elements should include automated interfaces to the operations support systems that the ILEC uses in connection with the ordering, provisioning, maintenance, and billing for the element. Our rationale for recommending the unbundling of these network elements is described below.

Loop Elements

Description of the Loop Elements

The first three unbundled elements relate to the local loop, i.e., the group of network elements used to provide connections between a subscriber's premises and the ILEC's end office.

1. Loop Distribution - The loop distribution element is comprised of the physical wires that connect the network interface at a subscriber's premises⁴ to the equipment where loop distribution facilities from multiple subscribers are brought together.⁵ Typically, loop distribution is provided by a twisted copper pair, but it may also be provided through use of coaxial cable or fiber optic cable, or a combination.

2. Loop Concentrator/Multiplexer - The loop concentrator/multiplexer element is network equipment which multiplexes and concentrates traffic generated through the individual loop distribution facilities that serve numerous customer locations. The concentration function enables the ILEC to deliver traffic between the loop concentrator/multiplexer and the local end office over higher speed and more cost-effective loop feeder facilities, e.g., digital asynchronous links. The loop concentrator/multiplexer also disaggregates (or deconcentrates) traffic coming over the loop feeder facilities from the ILEC switch, so that calls can be directed to individual

⁴ The network interface is a termination device that establishes the point of demarcation between the ILEC's network and the customer's wiring. An ILEC's provision of the loop distribution network element includes the network interface.

⁵ In cases where there is no concentration of traffic, the loop distribution equipment connects directly to the loop feeder element.

end users over the loop distribution plant. Facilities used to provide the loop concentrator/multiplexer function include digital loop carrier equipment, channel bank or similar equipment.⁶

3. Loop Feeder - The loop feeder element is the transmission facility used to transmit traffic between the loop concentrator/multiplexer and the main distribution frame or DSX cross-connect panel for the ILEC's switch in a central office or similar environment.⁷ As noted above, this is often a high speed digital facility that permits more cost-efficient delivery of the concentrated traffic. This capability is provided through the use of copper, coaxial or fiber cable, or a combination.

Competitive Rationale for Requiring the Unbundling of Loop Elements

Unbundling of the loop distribution element is necessary for CAPs which have deployed local fiber rings and their own switches, but do not have local distribution facilities. Such carriers may wish to use their fiber rings to transport traffic between their switch and the ILEC's loop concentrator/multiplexer (i.e., provide their own loop feeder

⁶ Fiber node termination equipment may be used in some applications.

⁷ In cases where there is no concentration of traffic, the loop feeder connects directly to the loop distribution facility.

capabilities). In such cases, for example, the CAP could use the ILEC's loop distribution plant, in conjunction with the loop concentration capabilities, to deconcentrate traffic coming from the CAP switch and deliver it to individual end users. In addition, in some multiple residential settings, particularly apartment developments, the loop concentrator/multiplexer is located in the apartment building itself. Accordingly, use of the ILEC's loop concentrator/multiplexer and loop distribution plant may be the only practical way for CLECs to reach individual dwellings in these situations.

Unbundled access to the loop feeder element may be important to cable providers that have their own distribution plant but wish to use the ILEC's concentration and feeder capabilities to transport traffic to and from the ILEC's switch.

Use of the loop concentrator/multiplexer and/or feeder may also be helpful in the event that wireless technology evolves as a substitute for the loop distribution element.

Multiplexing or concentration capabilities (when used) are employed in each of the above circumstances. In order to assure that carriers which need only the concentration functions and feeder do not pay for the loop distribution functions, and also to assure that carriers which need only the deconcentration and demultiplexing and loop distribution functions are not required to pay for the loop feeder functions, ILECs should be

required to unbundle the loop concentration element from each of the other loop elements. This will effectively permit competitive carriers to purchase only the specific services required to meet their needs.

Technical Feasibility

The technical feasibility of establishing interconnection with loop elements is established in numerous existing technical specifications. Accordingly, there should be no difficulty in establishing interconnections for these elements.⁸

4. Switching The ILEC switch is the network element which provides the functionality needed to connect the lines or trunks terminated on the main distribution frame or DSX panel so as to establish the communications path desired by a subscriber.

ILEC switching provides basic features such as dial tone, basic switching, signaling, digit reception, dialed number translations, routing and rating, call supervision, announcements, calling features and capabilities, centrex and CIC code determination. In addition, the ILEC switch provides access to transport, as well as access to databases, adjunct processors,

⁸ There are many applicable technical specifications, depending upon the type of facilities used to provide the various loop functions. Some of the applicable standards are collected in Appendix A.

911, 611, and operator systems (including operator services and directory assistance platforms). It also provides the capability to offer Advanced Intelligent Network ("AIN") features, to the extent AIN triggers are available in a given ILEC switch.

AIN features include advanced capabilities that many customers desire and that CLECs must therefore be able to provide. They include, for example, caller ID capabilities that provide the caller's name as well as his or her phone number; call management capabilities that allocate calls to different phone numbers used by a particular customer; and routing capabilities that enable a customer to vary the point of termination for incoming calls depending on the time of day. Such features are created through access to the ILEC service creation environment and service management system. Access from the ILEC switch to the service application logic in the SCP is provided through the use of the AIN triggers. In order to assure the greatest variety of AIN services for consumers, ILECs must provision carriers' orders to use any or all available AIN triggers in a nondiscriminatory manner. Thus, carriers' orders for AIN triggers must be processed using systems and timelines comparable to those the ILEC provides for itself.⁹ Finally,

⁹ ILECs must also provide competitors with sufficient information to enable them to place orders for AIN triggers.

ILECs must permit carriers to interconnect their own or third parties' service control points so that AIN triggers can be used to provide consumers with additional AIN services that are developed by such third parties. Accordingly, ILECs may not block or decline to accept TCAP messages¹⁰ between ILEC switches and third parties' SCPs.

Competitive Rationale for Requiring the Unbundling of Switching

The competitive rationale for offering the switch as an unbundled network element is twofold. First, switches can be separately purchased by a CLEC from a manufacturer. CAPs such as MFS, TCG, and Cablevision, for example, also own and operate their own switches in New York. IXCs already own numerous switches which could be adapted for use in local exchange service. Permitting the ILECs to bundle the switching element with other network elements, rather than make switching available as an unbundled element, would make it less economical for CLECs to own their own switches and thereby impede the development of local facilities-based competition.

Conversely, CLECs that own other network elements may require ILEC switching capabilities. The switch is an essential

¹⁰ TCAP messages are non-call associated signaling messages between SS7-equipped switches and service control points that are used to provide additional features and services.

element in the provision of local exchange service, and cable and wireless companies that own some or all of the loop elements may nevertheless require access to ILEC switches, particularly if they are to provide advanced features and functions through the ILEC switch.

Technical Feasibility

The technical feasibility of interconnection with LEC switching is well-established. With respect to competing carriers that own their own switches, tariffs filed by Ameritech, SNET, NYNEX, Southwestern Bell and Bell Atlantic permit the interconnection of a competitor's switch to the ILEC's loop. All of the LECs that have unbundled their loops have provided specifications to CLECs regarding requirements for such interconnections, which are made at the main distribution frame in the LEC end office (where the loop is connected to intra-office facilities that terminate in the CLEC's collocated space).

There are likewise established technical specifications for interconnections between competitors' loop facilities and LEC-owned switches.¹¹

5. Operator Systems - Operator systems are the network facilities the ILEC uses to process and record calls requiring

¹¹ See Appendix B, which also identifies the Ameritech specifications referenced in its port and loop technical specifications.

the assistance of a live operator (including directory assistance), as well as calls that require special billing, e.g., calling card, collect, coin, and billed to third number calls.

Competitive Rationale for Requiring the Unbundling of Operator Systems

CLECs that have already invested in operator systems should be permitted to maximize the value of such investments and should not be required to purchase the use of ILEC operator systems. Alternatively, carriers that build their own networks, including switches, may choose not to invest (at least for some time) in operator systems. Nevertheless, consumers expect that competitive carriers will provide a full complement of services, including services that rely upon operator systems. Thus, it is critical that competitive carriers continue to have access either to ILECs' operator systems or to alternative suppliers.

Technical Feasibility

Many ILECs today use their operator systems to provide various "rent an operator services" to other carriers unbundled from other network elements. For example, the Woodbury Telephone Company (an ILEC) and TCG (a CAP) both purchase operator systems from SNET. Operator systems are also provided to local exchange carriers under contract by interexchange carriers, such as AT&T and MCI. The technical feasibility of interconnection with operator systems has been established by the existing provision

of those systems on an unbundled basis. Interfaces with the LECs' operator systems can be obtained merely by purchasing interconnecting trunks. In addition, the Commission has required in CC Docket No. 91-115 that various types of information which support LEC operator services functions must be made available to IXC's. Thus, there should be no technical difficulty in making ILEC operator systems available on an unbundled basis to other requesting carriers.¹²

Transport Elements - Transport elements are used to provide connections between ILEC facilities and the networks of other carriers. There are three transport elements that must be made available on an unbundled basis: dedicated transport, common transport and tandem switching.

Description of the Transport Elements

6. Dedicated Transport - The dedicated transport element is an interoffice transmission path between an ILEC's end office or tandem switch and a CLEC's switching system or an interexchange carrier's ("IXC's") point of presence that is dedicated in its entirety for the full-time use of the CLEC or IXC subscriber. This element provides the subscribing carrier with the ability to send individual and/or multiplexed switched

¹² Applicable technical standards and references are listed in Appendix C.

and special services traffic between the ILEC offices and the subscribing carrier's network.

7. Common Transport - The common transport element is an interoffice transmission path between an ILEC's end office and tandem switch that carries commingle traffic of more than one carrier. Common transport also carries commingle traffic between points in the ILEC network and is critical to CLECs' ability to connect adjacent unbundled network elements.

8. Tandem Switching - The tandem switching element is an ILEC facility that establishes a temporary communications path by connecting common trunks to dedicated trunks for the purpose of connecting calls between two switches. This element is used, among other things, to switch calls between ILEC and CLEC switches and between ILEC and IXC switches.

Competitive Rationale for Requiring the Unbundling of Transport Elements

Unbundling dedicated transport will allow CLECs to use high-speed facilities to connect their offices to an ILEC switching office. If CAPs can provide dedicated transport more cost-effectively than ILECs, IXCs should be permitted, and even encouraged, to use such alternatives. That would permit IXCs to route traffic directly to the CLECs' customers without having to traverse the ILEC switch. The Commission has previously ordered